

Three new species of *Alvania* (Gastropoda, Prosobranchia, Rissoidae) from São Tomé Island (Gulf of Guinea, West Africa)

Tres nuevas especies de *Alvania* (Gastropoda, Prosobranchia, Rissoidae) de la isla de Santo Tomé (Golfo de Guinea, África occidental)

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ABSTRACT

Three new species of the genus *Alvania* collected in São Tomé Island are described. The new species are compared with others of similar morphology from the African coast. Some characters, usually considered typical of the genus *Manzonina* are commented on; these appear in some species here included in the genus *Alvania*. The latter genus probably constitutes a kind of catchall for many other valid genera that are at present inadequately defined.

RESUMEN

Se describen tres especies nuevas del género *Alvania* recolectadas en la isla de São Tomé. Se comparan las nuevas especies con otras de morfología similar de la costa africana. Se hacen comentarios sobre los caracteres que se consideran típicos del género *Manzonina* y que aparecen en algunas especies del género *Alvania*, considerando que, este último género, constituye probablemente un cajón de sastre para otros muchos géneros no bien definidos.

KEY WORDS: Rissoidae, *Alvania*, *Manzonina*, Gulf of Guinea, São Tomé Island, new species.

PALABRAS CLAVE: Rissoidae, *Alvania*, *Manzonina*, Golfo de Guinea, Santo Tomé, especies nuevas.

INTRODUCTION

The West African species of the genus *Alvania* (sometimes as *Manzonina*) (Rissoidae) from the islands of the Gulf of Guinea have been studied in several works (ROLÁN AND FERNANDES, 1990; GOFAS, 1999; ROLÁN, 2001, 2004).

From the material collected on a recent trip to São Tomé, some new species have been separated and their description is the object of the present work.

Abbreviations:

- AMNH American Museum of Natural History, New York
- BMNH Natural History Museum, London
- MNHN Muséum National d'Histoire Naturelle, Paris
- MNCN Museo Nacional de Ciencias Naturales, Madrid

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USNM United States Natural History,
Smithsonian Institution, Washing-
ton

CER collection of Emilio Rolán
CJH collection of José María Hernández
CPR collection of Peter Ryall

SYSTEMATIC PART

Genus *Alvania*

Alvania gemina spec. nov. (Figs. 1-3)

Type material: Holotype (Fig. 1) 2.9 mm in MNCN (15.05/47030). Paratypes in the following collections: from São Tomé MNHN(1), AMNH(1), USNM(1), BMNH (2), CER (2 and 24 fragments), CSG(2), CJH(2); from Annobón: CER(2).

Type locality: Lagoa Azul, São Tomé Island, 20-30 m, on coral bottom.

Etymology: The specific name derives from the Latin name *geminus* that means "sibling", which refers to the similarity between this species and *A. africana*.

Description: Shell (Fig. 1) high conical, solid, with brown bands of colour which, on the last whorl, are near the suture and on the base, with a wide light band between them. Protoconch (Fig. 2) paucispiral, with a little more than $1\frac{3}{4}$ whorls, a diameter of $368\ \mu\text{m}$, and a nucleus of $80\ \mu\text{m}$; the microsculpture is formed on the nucleus by 6 very fine spiral threads which have between them sparse small tubercles (Fig. 3); after $\frac{3}{4}$ of a whorl, the embryonic part ends and the larval part continues with a subsutural area mostly smooth but with some tubercles at the beginning, while the rest of the whorl has scattered tubercles much larger than those on the embryonic part, some of them aligned in a row.

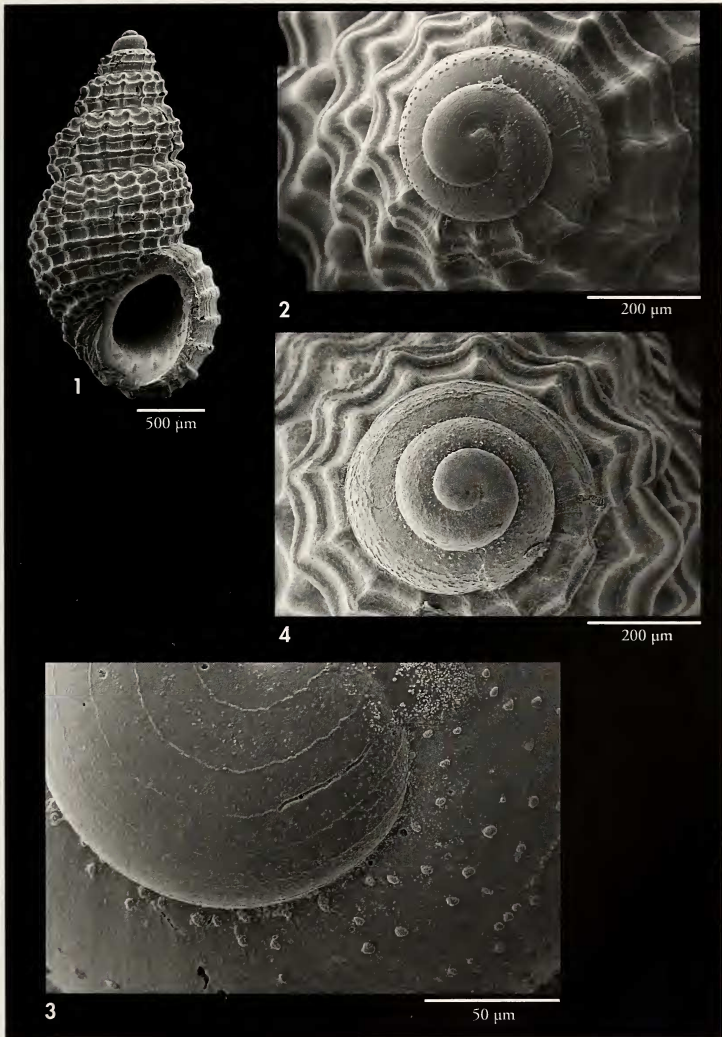
Teleoconch with 4 convex whorls, on which there are spiral cords, 2 on the first whorl, 3 on the second, 4 on the third, and about 10 on the last one, 5 of them below the periphery; on the last whorl, the spiral cords are closer together on the upper part of the whorl than on the lower part; the two lowest cords near the base, are very close to the aperture, almost in a vertical position and not nodulous. No umbilicus. All spiral cords similar in size but narrower than the interspaces, mainly on the lower part. Narrow axial ribs, about 12, 13 and 14 on the first whorls and 18-20 on the last one. The spiral cords cross the axial ribs forming nodules. Aperture ovoid, peristome continuous and ele-

vated. About 8 lirae inside the external lip, which is thickened and has a serrate external profile due to the endings of the spiral cords.

Dimensions: the holotype measures 2.9 mm; other shells may be a little smaller.

Distribution: Known from São Tomé and Annobon. Some fragments from Principe could belong to this species.

Remarks: The present species is very similar to *Alvania africana* Gofas, 1999 and *A. beani* (Hanley, 1844) which, according to GOFAS (1999), have rather similar shells, both having multispiral protoconch of $2\frac{1}{4}$ whorls. The comparison of the protoconch of *A. africana* (Fig. 4) with that of *A. gemina* spec. nov. is shown in detail in Table I. These characters are constant, and all the material examined from São Tomé had the same dimensions and sculpture. No substantial difference in protoconch morphology was found among the material collected in the São Tomé and Annobon islands, whereas those were consistently different from specimens collected in Angola or Senegal). It is known that some variations can be present in the size of the protoconch of some species (VERDUIN, 1977). Sometimes, probably due to different conditions over a large distribution range, protoconchs within one species can show some variation between distant populations, as observed e.g. in Nassariidae (ROLÁN, 1986).



Figures 1-3. *Alvania gemina* spec. nov. 1: holotype, 2.9 mm, Lagoa Azul, São Tomé (MNCN); 2: protoconch, paratype (CER); 3: microsculpture of the protoconch. Figure 4. Protoconch of *A. africana*, Luanda, Angola.

Figuras 1-3. *Alvania gemina* spec. nov. 1: holotipo, 2,9 mm, Lagoa Azul, Santo Tomé (MNCN); 2: protoconcha, paratipo (CER); 3: microescultura de la protoconcha. Figura 4. Protoconcha de *A. africana*, Luanda, Angola.

Table I. Comparison of the characters of the protoconch of *A. africana* and *A. gemina* spec. nov.
 Tabla I. Comparación de los caracteres de la protoconcha de *A. africana* y *A. gemina* spec. nov.

	<i>A. africana</i>	<i>A. gemina</i> spec. nov.
nucleus diameter	48 µm	80 µm
embryonic part	150 µm	210 µm
spiral whorls	2.3-2.5	1.7-1.88
protoconch diameter	445 µm	368 µm
larval shell: subsutural area	with tubercles	mostly smooth
lower part of the whorls	irregular tubercles forming lines	separated tubercles

A long planktotrophic period is not believed to be convenient for any species living in an archipelago or an isolated island. This is so because during the planktonic stage the larvae are probably sent outside of the habitable area, decreasing the colonizing efficiency of the species. Thus, it may be expected that any shortening or loss of the planktotrophic development will be advantageous. In fact, we know that the change from a planktotrophic to a lecithotrophic development has occurred often in isolated archipelagos or islands.

Another factor which calls for some comments is the geographic situation of *A. gemina*. It lives in the middle of the range of *A. africana* which extends from Senegal to Angola but occupying only the islands of the Gulf of Guinea. These islands are located in a region where the north Atlantic current (Guinean current) and the South Atlantic current (Benguela current) are confluent, and define an area where the influx of larval molluscs from North and South is found

close to the coast, the islands being relatively free from this influence. In *A. gemina* the larvae show a short planktonic development. This case may represent an intermediate stage between the planktotrophic and the lecithotrophic development, and probably represents a transitory situation in which the shorter planktotrophic period is useful to a species which colonizes several islands in the Gulf of Guinea.

A similar situation may be that represented by the European species *Alvania cimex* (Linné, 1758) and *A. mammillata* (Risso, 1826) with different sized planktotrophic protoconch (see VERDUIN, 1986).

Differences with similar shells: *A. beani* (Hanley in Thorpe, 1844), from European locations, has a shell with a smaller number of slightly prosocline axial ribs and of spiral cords, the protoconch with 2.3 whorls.

A. mediolittoralis Gofas, 1990, from the Azores, has the spiral cord darker and the protoconch has only one whorl with spiral lines.

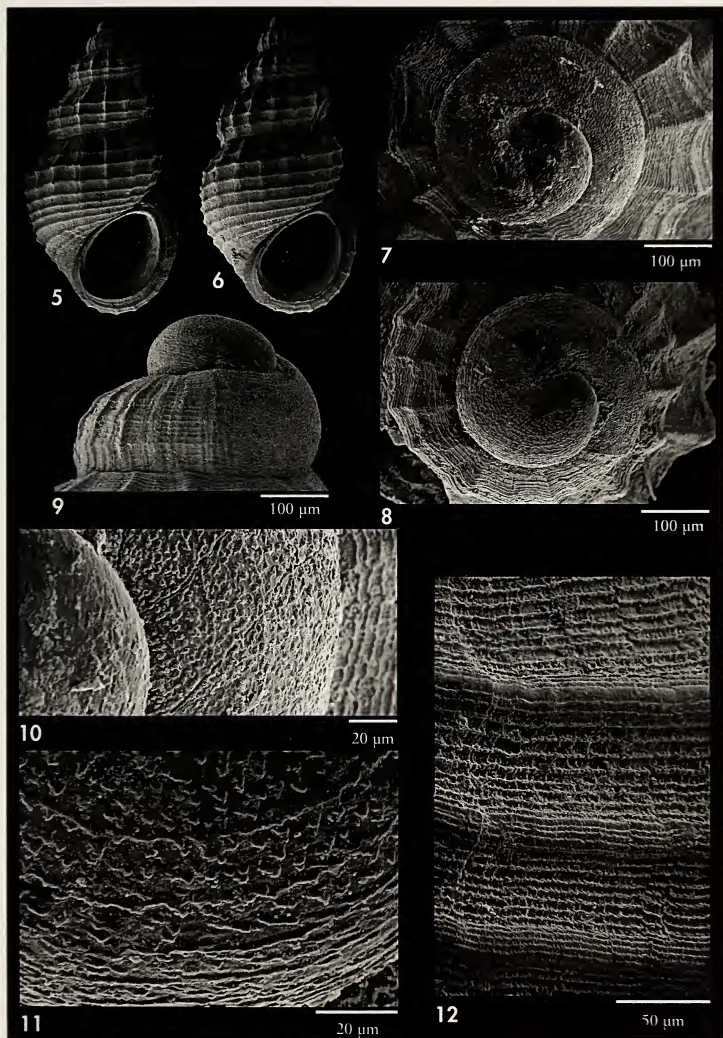
Alvania cabrensis spec. nov. (Figs. 5-12)

Type material: Holotype (Fig. 5) of 2.3 mm in MNCN (15.05/47031). Paratypes in the following collections: MNHN(1, Fig. 6), BMNH (1), AMNH(1), USNM(1), CER (6 and 14 fragments), CJH(1), CSG(1).
Type locality: Near the Ilheu das Cabras, 30-35 m, São Tomé Island, muddy bottom.

Etymology: The specific name refers to the name of the islet near which the shells were collected.

Description: Shell small (Figs. 5, 6), conical, solid. Protoconch (Figs. 7-9) with a little over 1 whorl, diameter of 330 µm with nucleus about 120 µm; sculpture

(Figs. 10, 11) formed by a multituberculate surface on which some tubercles form 4-5 spiral threads hardly appreciable by the end of the whorl (Fig. 9). Teleoconch



Figures 5-12. *Alvania cabrensis* spec. nov. 5: holotype, 2.3 mm, Ilheu das Cabras, São Tomé (MNCN); 6: paratype, 2.4 mm (MNHN); 7-9: protoconchs; 10, 11: microsculpture of the protoconch; 12: microsculpture of the shell.

Figuras 5-12. Alvania cabrensis spec. nov. 5: holotipo, 2,3 mm, Ilote das Cabras, Santo Tomé (MNCN); 6: paratipo, 2,4 mm (MNHN); 7-9: protoconchas; 10, 11: microescultura de la protoconcha; 12: microescultura de la concha.

with 4 convex whorls, on which there are spiral cords, similar in size but narrower than the interspaces: 3 on the first three whorls, and about 10 on the last whorl, 5 of them below the periphery; the subsutural area is free from cords, and these are set wider apart on the middle of the whorl than towards the base; the two lowest cords are very close to the aperture and in a vertical position. Umbilicus absent or at most reduced to a fine sulcus. Narrow axial ribs, 12 on the first whorls and 14-15 on the last whorl, fading out at the suprasutural part of the whorls and below the periphery. The spiral cords cross over the axial ribs. Aperture ovoid, peristome continuous and elevated. External lip strongly thickened, over which the termination of the spiral cords forms a moderately prominent serrate profile. Colour uniformly brown, except for the white thickening of the external lip.

Microsculpture (Figs. 12) formed by 8-15 small irregular threads between the spiral cords crossed by numerous growth lines; on the spirals there are 5-7 sulci, on the bottom of which there are pits.

Dimensions: the holotype measures 2.3 mm; some paratypes can reach 2.8 mm.

Distribution: Only known from the type locality. Some fragments were collected in areas nearby.

Remarks: The most similar species are commented below.

Alvania coseli Gofas, 1999, from Morocco, Mauritania and Senegal, has the last whorl less elevated, the aperture with a narrower external lip, the protoconch has wider flat spiral cords with microtubercles between them and not the fine and dense microsculpture of *A. cabrensis* spec. nov.

Alvania gascognei Rolán, 2001 (Fig. 22), from Annobon, has more numerous spiral cords, with a microsculpture of pits, and the protoconch has only spiral lines.

Alvania annobonensis Rolán, 2004 (Fig. 17), from Annobon island, is smaller, the protoconch has very irregular spiral lines, the spiral cords are very closely set on the upper part of the whorl and separate at the base, the peristome is double, the microsculpture has pits aligned in rows on the spiral cords and the cords ending at the external lip are more numerous.

Alvania thomensis (Rolán and Fernandes, 1990) (Fig. 20), from São Tomé Island, has the spiral cords at the base more separated and prominent, the peristome is double and the microsculpture has evident pits on the cords.

Alvania portentosa spec. nov. (see below) has a smaller shell, the colour is more uniformly pink-cream, the spiral cords are wider, the upper one very near the suture, the microsculpture has pits on the cords.

The following European species have similar shells.

Alvania cimicoides (Forbes, 1844) has a more solid and larger shell with a multispiral protoconch.

Alvania scabra (Philippi, 1844) and *A. sculptilis* (Monterosato, 1877) have smaller shells, with only three spiral whorls on the teleoconch, a smaller number of spiral cords and the protoconch with a different sculpture.

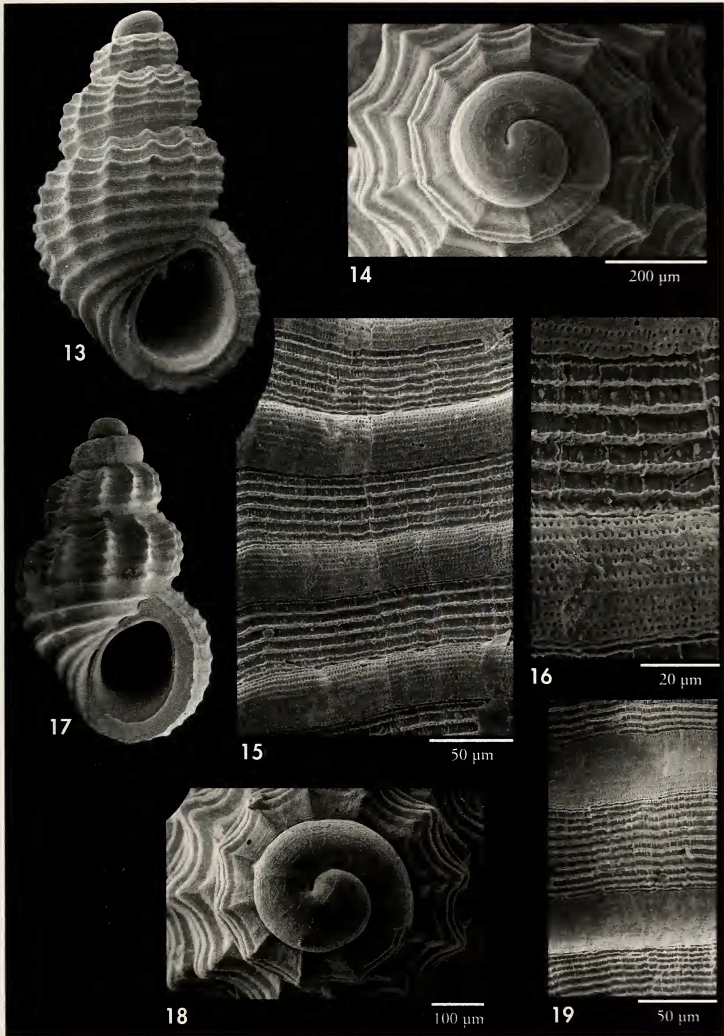
Alvania parvula (Jeffreys, 1844) and *A. tomentosa* (Pallary, 1920) have smaller shells with a smaller number of spiral threads, and their protoconch has strong spiral cords.

Alvania portentosa spec. nov. (Figs. 13-16)

Type material: Holotype (Fig. 13) of 1.8 mm in MNCN (15.05/47032). Paratypes in the following collections: MNHN(2), AMNH(2), USNM(2), BMNH(2), MCZ(2), ZMS(2), CER(40 and 62 fragments), CSG(2), CJH(2).

Type locality: Lagoa Azul, 30-35 m, São Tomé Island.

Etymology: The specific name is from the Latin name *portentosus* which means "extraordinary", alluding to the fact that we were surprised to find this species in relative quantity, although it had not been collected on several previous trips.



Figures 13-16. *Alvania portentosa* spec. nov. 13: holotype, 1.8 mm (MNCN); 14: protoconch; 15, 16: microsculpture of the shell. Figures 17-19. *Alvania annobonensis*. 17: shell, 1.5 mm (CER); 18: protoconch; 19: microsculpture.

Figuras 13-16. Alvania portentosa spec. nov. 13: holotipo, 1,8 mm (MNCN); 14: protoconcha; 15, 16: microescultura de la concha. Figuras 17-19. Alvania annobonensis. 17: concha, 1,5 mm (CER); 18: protoconcha; 19: microescultura.

Description: Shell minute (Fig. 13), conical, rather solid. Protoconch (Fig. 14) with a little over 1 whorl, diameter of 330 μm and a nucleus with about 90 μm ; the sculpture formed by 5-6 very fine spiral threads. Teleoconch with 3- 3 $\frac{1}{4}$ convex whorls, on which there are spiral cords, 3-4 on the first, 6 on the second and 11 on the last whorl, the lowest one very close to the aperture and in vertical position; they cross the axial ribs, being similar in size, narrower than their interspaces, the uppermost very close to the suture. Axial ribs, 11 on first two whorls and 13 on the last; they fade at the supra-sutural portion and below the periphery. Aperture ovoid, peristome continuous and elevate. External lip thickened and with a serrate profile due to the endings of the spiral cords. Umbilicus reduced to a fine sulcus.

Colour generally light brown, pink or cream, the lower part of the whorls slightly darker in most shells; the upper and sometimes the second spiral cords often light brown; below them the shell has a lighter hue; the aperture is white and interiorly two brown parts can be seen by transparency.

Microsculpture (Figs. 15, 16) formed by 5-8 small threads between the spiral cords and by 7-10 lines of pits on each cord.

Dimensions: The holotype measures 1.8 mm; some paratypes reach 2.1 mm.

Distribution: Only collected around Lagoa Azul, São Tomé, but it is reasonable to assume that the species can live in other places on coral bottom about 30 m deep.

DISCUSSION

Some of the species here described could be included in the genus *Manzonina* Brusina, 1870. Nevertheless, the characters of this genus are not totally clear. PONDER (1985) redescribes *Manzonina* and separates it from *Alvania* Risso, 1826 "...by the duplicate peristome, and strong rather smooth basal spirals". He also considered that the genus *Onoba* H. and A. Adams, 1852 "... from which it differs in its *Alvania*-like sculpture and duplicate peristoma", is close but different.

Remarks: The most similar species are commented below.

Alvania coseli Gofas, 1999 from Morocco, Mauritania and Senegal is larger, with a more elevated spire, the aperture with narrower external lip, the protoconch has wider flat spiral cords with microtubercles between them and the microsculpture of the spiral cords is not formed by pits.

Alvania annobonensis Rolán, 2004 (Fig. 17) from Annobon Island is smaller, the protoconch (Fig. 18) has very irregular spiral lines, the spiral cords are very close on the upper part of the whorl and separate at the base, the peristome is double, the cords which end at the external lip are more numerous and the microsculpture (Fig. 19) on the ribs has a smaller number of lines of pits.

Alvania gascognei Rolán, 2001 (Fig. 22), from Annobon, has a larger size and more numerous spiral cords.

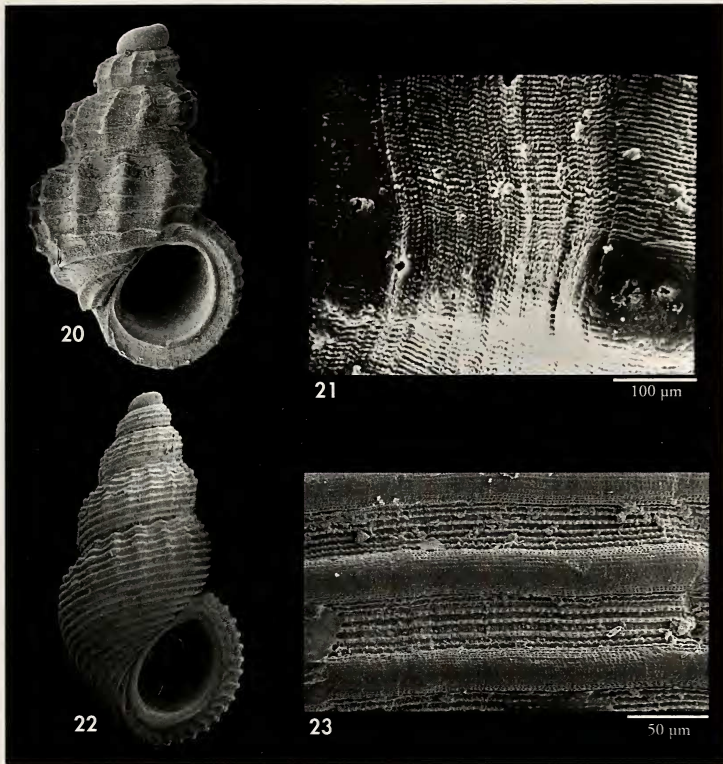
Alvania thomensis (Rolán and Fernandes, 1990) (Fig. 20), from São Tomé, has the spiral cords at the base more separate, the peristome is double and the microsculpture lacks pits.

Alvania parvula (Jeffreys, 1844) from the Mediterranean, may be somewhat similar but has more numerous axial ribs, the external lip not thickened, the protoconch with a sculpture formed by more numerous and wider spiral cords.

Alvania tomentosa (Pallary, 1920), from the Alborán Sea, has a higher shell, more numerous axial ribs, a narrower external lip and the protoconch is more sculptured.

MOOLENBEEK AND FABER (1987) pointed out the differential characters for *Manzonina*: "...a strong duplicate peristoma, rather deep and smooth basal spirals, and a typical microsculpture". ROLÁN AND HERNÁNDEZ (2004) comment on the difficulty of placing a clear separation between the genera *Manzonina* and *Onoba*.

In the present work, we have examined these characters from the species known from the Gulf of Guinea, and we have noticed a transition between *A.*



Figures 20, 21. *Alvania thomensis*. 20: shell, 1.9 mm, São Tomé city (CER); 21: microsculpture. Figures 22, 23. *Alvania gascognei*; 22: holotype, 2.7 mm, San Antonio de Palé, Annobon (MNCN); 23: microsculpture.

Figuras 20, 21. *Alvania thomensis*. 20: concha, 1,9 mm, ciudad de Santo Tomé (CER); 21: microscultura. Figuras 22, 23. *Alvania gascognei*; 22: holotipo, 2,7 mm, San Antonio de Palé, Annobón (MNCN); 23: microscultura.

annobonensis, which has the three characters mentioned in MOOLENBEEK AND FABER (2004), and *A. gemina*, which does not have any whereas the other species have an intermediate situation (see Table II). We did not find a discriminating character separating both genera, as we had mentioned regarding the separation of *Manzonina* and *Onoba* (ROLÁN AND HERNÁNDEZ, 2004). For this reason,

we think that the separation of several genera usually included in the wide spectrum of the characters admitted for *Alvania*, would need more detailed characters based on the soft parts or on DNA sequence differences. We also believe that in the genus *Alvania* many species with very different characters have been included, practically all those which cannot be placed in another

Table II. Manzonian character present in the species of the Guinean Gulf.
 Tabla II. Caracteres propios del género *Manzonina* presentes en las especies del Golfo de Guinea.

Taxa	manzonian cords	double peristome	pits microsculpture
<i>A. annobanensis</i>	yes	yes	yes
<i>A. thomensis</i>	yes	yes	no
<i>A. gascognei</i>	no	intermediate	yes
<i>A. portentosa</i>	no	intermediate	yes
<i>A. cabrensis</i>	no	intermediate	between cords
<i>A. gemina</i>	no	no	no

genus on the basis of some specific characters. Therefore, it is probable that in the future, with more information, *Alvania* could be divided into several genera.

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